

REMARKS

Claims 1, 2 and 4-17 currently appear in this application. The Office Action of August 11, 2005, has been carefully studied. These claims define novel and unobvious subject matter under Sections 102 and 103 of 35 U.S.C., and therefore should be allowed. Applicants respectfully request favorable reconsideration, entry of the present amendment, and formal allowance of the claims.

Election/Restrictions

The election of species requirement has been withdrawn.

Claim Objections

Claims 3-6, 8, 9 and 11-15 are objected to because of informalities.

The present amendment corrects the informalities noted by the Examiner.

Double Patenting

Claims 1-2 and 5-16 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-14 of U.S. Patent No. 6,686,517.

This rejection is respectfully traversed. Applicants do not know which claims in the present application

will be held allowable, and it is respectfully submitted that a double patenting rejection at this stage of the prosecution is premature.

Rejections under 35 U.S.C. 112

Claims 1-17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The specification is said only to provide a written description for *Raphanus* line V33 having large quantities of anthocyanins. Claims 7, 10 and 11 are said to fail to provide a written description of the broad genus of *Raphanus* sprouts or plantlets having anthocyanins at a level of at least 100 nmol per gram fresh weight of sprouts...

This rejection is respectfully traversed. The claims have now been limited to the single species *Raphanus sativa*, and are no longer directed broadly to the genus *Raphanus*.

It is respectfully submitted that the claims fully satisfy the written description requirement and that the inventors were in possession of the claimed invention on the date of filing. The inventors made a *Raphanus sativa* plant having very high anthocyanin levels, line V33, the seed of which was deposited under ATCC No. PTA-3630. Example 1 describes this line, wherein it is shown that V33 produces a sprout having >6000 nmol/g of fresh weight anthocyanins.

Using these deposited seeds, any *Raphanus sativa* plant having at least 800 nmols/g fresh weight anthocyanins can be made by simple breeding methods, as described on page 4, lines 15-24.

Claims 1-17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims are said to contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or to which it is most nearly connected, to make and/or use the invention.

This rejection is respectfully traversed. As noted above, the specification fully enables one skilled in the art to make a *Raphanus sativa* plant as claimed. Specifically, the seed deposit can be used to make a *Raphanus sativa* plant containing at least 800 nmols/g fresh weight anthocyanins. The seed can be germinated to obtain a purple sprout as claimed, and the plant obtained from the seeds can be selfed or crossed with another *Raphanus sativa* plant. The progeny of the selfing or crossing can be used to obtain many more *Raphanus sativa* plants having sprouts with the claimed anthocyanin levels.

Submitted herewith is a statement by the attorney of record stating that the deposit has been deposited under the Budapest Treaty and that the seeds will be irrevocably and

without restriction or condition be released to the public upon issuance of a patent.

The Examiner's opinion that the broad genus *Raphanus* is not enabled by the specification is rendered moot by the present claim amendments. However, Applicant cannot agree with the Examiner's view that the specification is only enabled for *Raphanus sativa* line V33 having anthocyanin levels of at least 100 nmol/g fresh weight. In support of this position, the Examiner cites Hoshi et al. and Savoskin et al.

It should be noted that Hoshi et al. relate to the species *Brassica campestris*, and not to *Raphanus sativa*. Therefore, Hoshi et al. cannot be used to draw conclusions about anthocyanin genetics in *Raphanus sativa*. Secondly, Hoshi et al. and Savoskin et al. relate to the accumulation of anthocyanins in the roots of the plants, while the present invention relates to anthocyanin accumulation in sprouts, i.e., the hypocotyls and cotyledons. It should be noted that the present specification uses the term "turnip" for "radish."

The fact that anthocyanin accumulation may be genetically complex does not prove that the present invention is not enabled, or that undue experimentation may be required to make or use the claimed plants. It is respectfully submitted that there is no undue experimentation required to make *Raphanus sativa* plants having at least 800 nmols/g fresh weight anthocyanin using the seed deposited and optionally

using visual selection of purple sprouts and known anthocyanin extraction and quantification methods to determine the exact levels.

It is explicitly shown in the specification as filed at page 10, lines 20-24, that if two of the seeds of the deposit are germinated and the plants are crossed with each other or selfed, all of the progeny will also produce dark purple sprouts. That is, V33 is a line that does not divide out green descendants, i.e., all progeny sprouts are dark purple, like the parents. These progeny can again be crossed or selfed and will retain the dark purple colored sprouts of the parents. Thus, many *Raphanus sativa* plants can be made in this way, all of which contain at least 800 nmol/g fresh weight anthocyanins.

Alternatively, one can screen *Raphanus sativa* plants from public gene banks for *Raphanus sativa* plants having the ability to produce sprouts with at least some purple coloring. These plants can be selfed and/or crossed for several generations, and progeny can be selected having dark purple colored sprouts, all as described in Example 1, page 10, and on page 4, lines 18-24. Example 1 teaches that, within about 568 *Raphanus sativa* lines, about 14 lines produced sprouts with some purple coloring (about 2.5%). Example 1 further teaches that in this way, plants which produce sprouts having >6000 nmols anthocyanins per gram fresh weight can be made

(Table 1, page 16). This type of screening, crossing and selection does not require undue experimentation, especially because visual selection, based on cotyledon color, is possible, and, therefore, large trays of sprouts can be quickly screened for individuals having a purple color. The sprouts with purple cotyledons can be selected and crossed and/or selfed, until the cotyledon color is dark purple and the genetic inheritance of cotyledon color is such that all progeny have the parental purple color.

Art Rejections

Claims 1-12 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Giusti et al. 1996.

This rejection is respectfully traversed. Giusti et al. 1996 identified and measured the anthocyanin pigments in red radish epidermal tissue. There is nothing Giusti et al. 1996 that discloses or even suggests that sprouts of *Raphanus sativa* contained anthocyanins. Giusti et al. 1996 limited their study to the skin of the radish, and are completely silent with respect to sprouts. There is nothing in this article that suggests that sprouts could be obtained having greater anthocyanin content than conventionally obtained.

Claim 16 is rejected under 35 U.S.C. 102(b) as being anticipated by Giusti et al. 1998.

This rejection is respectfully traversed. As with Giusti et al. 1996, this article is concerned with anthocyanin pigments in the skin and flesh of radishes. There is nothing in Giusti et al. 1998 that suggests that *Raphanus savita* sprouts contain notable amounts of anthocyanins.

Claims 12-17 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as being obvious over Giusti et al. 1998.

This rejection is respectfully traversed. The claims have been amended to recite specific *Raphanus savita* plants, namely, those that contain high amounts of anthocyanins in the sprouts. Giusti et al. 1998 only disclose anthocyanins in the skin and flesh of radishes (see page 219, right column, second paragraph). There is nothing in Giusti et al. 1998 or 1996 that discloses or even suggests that plants can be made in which the sprout tissue (cotyledons and hypocotyls) contains high amounts of anthocyanins, and wherein the cotyledons are even changed in appearance from the customary green to dark purple. This change in appearance to purple was completely unexpected, as were the high levels of anthocyanins, which accumulated in the sprouts.

Based upon the teachings of Giusti et al. 1996 and 1998, one skilled in the art would have no indication that anthocyanins can accumulate in any tissue other than the skin or the flesh of radishes. Reading Giusti et al. 1996 and

1998, one skilled in the art would try to increase anthocyanin levels in the radish root, for two reasons:

1. The red skin of the radish turnips already has high anthocyanin levels (surrounding a white core), and it is the obvious choice for trying to increase anthocyanin levels further, as these cells clearly already have the ability to make and accumulate anthocyanins.
2. The radish root consists developmentally of the root and swollen hypocotyls. In Song et al., *J. Plant Biol.* **41(4)**: 277-282, 1995, a copy of which is submitted herewith, it is stated at page 281, left column, it is stated that the structural genes involved in anthocyanin accumulation "were strongly expressed in hypocotyls where anthocyanins accumulate, and they were not expressed in cotyledons where the pigment did not accumulate." [emphasis added]. From this article, one can conclude that only the root tissue has the capacity to make anthocyanins, while the cotyledon tissue does not have this capacity.

Thus, one skilled in the art would have tried to increase anthocyanin levels in the radish root. By doing so, the result would not be within the present claims as amended, as the screening and selection criteria would be completely different. That person would screen for radish plants having red roots, as done in Giusti et al. in 1998, and would cross and select using the root color as a criterion.

In contrast, the present inventors surprisingly found that plants could be bred which produce sprouts having dark purple cotyledons and high anthocyanin levels.

Claims 13-15 are rejected under 345 U.S.C. 103(a) as being unpatentable over Giusti et al. 1996 in view of Khare et al. and further in view of Poindexter.

This rejection is respectfully traversed. As noted above, there is nothing in Giusti et al. 1996 that would lead one skilled in the art to produce plants having anthocyanins in the sprouts, as Giusti et al. 19896 only produced plants with high levels of anthocyanins in the roots. Khare's disclosure of growing radish seeds in closed containers and Poindexter's disclosure of sprouting seeds add nothing to Giusti et al., because a combination of Giusti et al., Khare and Poindexter would lead one skilled in the art to grow

Appln. No. 10/625,628
Amd. dated October 12, 2005
Reply to Office Action of August 11, 2005

radish seeds of plants that had high concentrations of anthocyanins in the roots. In fact, Khare teaches away from increasing anthocyanin concentration in the cotyledons, as page 236, last line, states that in the presence of GA, the anthocyanin in the cotyledons was reduced.

In view of the above, it is respectfully submitted that the claims are now in condition for allowance, and favorable action thereon is earnestly solicited.

Respectfully submitted,

BROWDY AND NEIMARK, P.L.L.C.
Attorneys for Applicant

By: 

Anne M. Kornbau
Registration No. 25,884

AMK:srd
Telephone No.: (202) 628-5197
Facsimile No.: (202) 737-3528
G:\BN\N\enede\koppert1a\pto\AMD 12 OCT 05.doc